

IN THE CLAIMS:

In accordance with the following no claims are amended, cancelled, or added:

1. (PREVIOUSLY PRESENTED) An eccentricity compensation apparatus of a disk drive servo system having an actuator actuating a head to a position on a disk rotated by a spindle to read data on or reproduce data from the disk, the apparatus comprising:
 - an error detector that detects a position error between a reference head position and an actual position of the head on the disk;
 - a first compensation controller that receives the position error from the error detector and generates and outputs a first control value to compensate for the position error by changing the actual position of the head;
 - a second compensation controller that generates and outputs a second control value to compensate for eccentricity which varies depending on a phase of the spindle that rotates the disk; and
 - a gain/phase adjuster that adjusts gain and phase of the second control value output from the second compensation controller according to a reproduction speed of the disk,wherein a drive signal of the actuator is obtained by summing the signals output from the first compensation controller and the gain/phase adjuster,
 - wherein the second compensation controller comprises a feedforward look-up table that stores control data estimated at a predetermined reproduction speed and used for compensating the eccentricity via the gain and phase adjustment, and
 - wherein the gain/phase adjuster compensates for gain reduction and phase lag in frequency response characteristics of the actuator based on the control data in the feedforward look-up table estimated at a predetermined reproduction speed, without updating the control data in the feedforward look-up table each time the reproduction speed changes.
2. (CANCELLED)
3. (ORIGINAL) The apparatus of claim 1, wherein the gain/phase adjuster adjusts the gain and phase of the second control value output from the second compensation controller according to the disk reproduction speed based on frequency response characteristics of the actuator.
4. (ORIGINAL) The apparatus of claim 1, wherein the first compensation controller comprises a phase lead-lag controller to obtain the first control value.

5. (ORIGINAL) The apparatus of claim 1, wherein the first compensation controller is a feedback controller that receives a reference signal and an actual signal of the actuator which corresponds to the actual position of the head, to perform a compensation control using the received signals.

6. (ORIGINAL) The apparatus of claim 1, wherein the position error between the reference head position and the actual position of the head on the disk corresponds to a displacement of the actuator.

7. (CANCELLED)

8. (PREVIOUSLY PRESENTED) The apparatus of claim 1, wherein the control data in the feedforward look-up table used for the compensating of the eccentricity is obtained by using:

$$U_{ff}(s) = \frac{D(s)}{G(s)},$$

wherein,

$U_{ff}(s)$ and $D(s)$ denote the control data and the eccentricity, respectively, and $G(s)$ denotes a transfer function indicating the frequency response characteristics of the actuator.

9. (PREVIOUSLY PRESENTED) A method of eccentricity compensation of a disk drive servo system having an actuator actuating a head to a position on a disk rotated by a spindle to read data on or reproduce data from the disk, the method comprising:

detecting a position error between a reference head position and an actual position of the head on the disk;

receiving the position error, and generating and outputting a first control value to compensate for the position error by changing the actual position of the head;

generating and outputting a second control value to compensate for eccentricity which varies depending on a phase of the spindle that rotates the disk;

adjusting gain and phase of the second control value according to a reproduction speed of the disk, thereby obtaining a signal to drive the actuator from a summation of the first control value and the adjusted second control value; and

compensating gain reduction and phase lag in frequency response characteristics of the actuator based on control data in a feedforward look-up table estimated at a predetermined reproduction speed, without updating the control data in the feedforward look-up table each time

the reproduction speed changes.

10. (ORIGINAL) The method of claim 9, further comprising:
storing control data estimated at a predetermined reproduction speed and used for the compensating of the eccentricity via the gain and phase adjustment.

11. (ORIGINAL) The method of claim 9, wherein the adjusting of the gain and phase of the second control value according to the disk reproduction speed is based on frequency response characteristics of the actuator.

12. (CANCELLED)

13. (PREVIOUSLY PRESENTED) An eccentricity compensation apparatus of a disk drive servo system having an actuator actuating a head to a position on a disk rotated by a spindle to read data on or reproduce data from the disk, the apparatus comprising:

a controller generating and outputting first and second control values, the second control value being based on estimated control data at a predetermined reproduction speed of the disk and being used to compensate for eccentricity at varying reproduction speeds depending on a phase of the spindle; and

a gain/phase adjuster adjusting a gain and a phase of the second control value based on the control data at a reproduction speed of the disk based on frequency response characteristics of the actuator, without updating the control data each time the reproduction speed changes, wherein a drive signal of the actuator is obtained by summing the first control value and the adjusted second control value.

14. (PREVIOUSLY PRESENTED) A method of compensating for eccentricity of a disk drive servo system having an actuator actuating a head to a position on a disk rotated by a spindle to read data on or reproduce data from the disk, the method comprising:

generating and outputting first and second control values, the second control value being based on estimated control data at a predetermined reproduction speed of the disk and being used to compensate for eccentricity at varying reproduction speeds depending on a phase of the spindle; and

adjusting gain and phase of the second control value based on the control data at a reproduction speed of the disk based on frequency response characteristics of the actuator, without updating the control data each time the reproduction speed changes, wherein a drive signal of the actuator is obtained by summing the first control value and the adjusted second

control value.

15. (PREVIOUSLY PRESENTED) An eccentricity compensation apparatus of a disk drive servo system having an actuator actuating a head to a position on a disk rotated by a spindle to read data on or reproduce data from the disk, the apparatus comprising:

- an error detector that detects a position error between a reference head position and an actual position of the head on the disk;

- a first compensation controller that receives the position error from the error detector and generates and outputs a first control value to compensate for the position error by changing the actual position of the head;

- a second compensation controller that generates and outputs a second control value to compensate for eccentricity which varies depending on a phase of the spindle that rotates the disk; and

- a gain/phase adjuster that adjusts gain and phase of the second control value output from the second compensation controller according to a reproduction speed of the disk,

- wherein a drive signal of the actuator is obtained by summing the signals output from the first compensation controller and the gain/phase adjuster,

- wherein the second compensation controller comprises a feedforward look-up table that stores control data estimated at a predetermined reproduction speed and used for compensating the eccentricity via the gain and phase adjustment, and

- wherein the gain/phase adjuster compensates for gain reduction and phase lag in frequency response characteristics of the actuator based on the control data in the feedforward look-up table estimated at a predetermined reproduction speed.

16. (PREVIOUSLY PRESENTED) A method of eccentricity compensation of a disk drive servo system having an actuator actuating a head to a position on a disk rotated by a spindle to read data on or reproduce data from the disk, the method comprising:

- detecting a position error between a reference head position and an actual position of the head on the disk;

- receiving the position error, and generating and outputting a first control value to compensate for the position error by changing the actual position of the head;

- generating and outputting a second control value to compensate for eccentricity which varies depending on a phase of the spindle that rotates the disk;

- adjusting gain and phase of the second control value according to a reproduction speed of the disk, thereby obtaining a signal to drive the actuator from a summation of the first control value and the adjusted second control value; and

compensating gain reduction and phase lag in frequency response characteristics of the actuator based on control data in a feedforward look-up table estimated at a predetermined reproduction speed.